Disruptive Trends in Automotive Software Development

Automotive Line of Business (LoB)

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23 Aug 2018
Explosion in SW development by OEMs, Tier 1s

The modern premium vehicle

Over 100 ECUs

Approx. 100M SLOC

Article source:
https://www.linkedin.com/pulse/20140626152045-3625632-car-software-100m-lines-of-code-and-counting/
Disruption in Automotive Electronics – The Trends

**Trends**

- Consolidation
- Functional Safety
- Connectivity
- Security
- Over the Air Updates
- Open Source
- Commercial Software
- Long Term Support
ECU Consolidation – The Trend

- Mixed-Criticality
- Software Defined Architecture
- Leverage Virtualization
- Optimize Connectivity & Wiring

<table>
<thead>
<tr>
<th>ASIL-B</th>
<th>ASIL-QM</th>
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<th>ASIL-QM</th>
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</thead>
<tbody>
<tr>
<td>Instrument cluster (IC)</td>
<td>In-vehicle Infotainment (IVI)</td>
<td>Digital side view mirrors</td>
<td>V2X gateway</td>
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<td>Safety cert RTOS</td>
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Hypervisor (ASIL-B Certified)

ECU Hardware Platform

e.g., Cockpit Controller
Safety Focus – The Trend

• Fault Detection and Control
• Instrument Cluster – ASIL B
• Digital Mirrors – ASIL B
• ADAS Features – ASIL D
• Autonomous Drive – ASIL B, D
• Arm IP positioned as SEooC
Cabin Connectivity – The Trend

Vehicle Connectivity Requirements

• In-Vehicle Infotainment Services
• Telematics
• V2X Services
• Autonomous Inference Model Updates
• ECU Over the Air Updates
Security – The Trend

Requirements

• Secure Storage
• HW Root of Trust
• Secure Boot
• Secure KeyGen
• Trusted Execution Environment
• Secure Over The Air Updates
• Standard Framework/ API (PSA)
Ubiquitous Software Update – The Trend

Requirements

• Maintain security updates.
• SW update of an ECU relies on security features.
• Device identity and provisioning
• Vehicle architectures have to be considered
• ECU resources drives the capability.
Embracing Open Source – The Trend

Trends

- In-Vehicle Infotainment
- Linux
- Android
- Communication Frameworks
- Arm Trusted Firmware
- Trusted Execution Environment (TEE)
Leveraging Commercial SW Partners – The Trend

**Commercial Software Partners**

- Machine Learning Frameworks
- Application Frameworks (e.g., Audio, Video, Communication)
- Security and Safety Frameworks
- Operating System
- Safety Separation (Hypervisor)
Long Term Support – The Trend

Support Requirements

• 10 – 15 year support
• OTA Software Update
How can the Arm Ecosystem help?

- Risk Reduction
- Reduced Time to Market
- Pre-Certified Software Elements
- Multiple SoC and platform providers.
# SW Stack – Ecosystem of Partners

<table>
<thead>
<tr>
<th>Category</th>
<th>Solutions</th>
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</table>
| **Machine Learning on Arm** | • AiOTA Labs  
• Arm NN  
• Brodmann17  
• Codeplay  
• DeepScale  
• Enigma Pattern  
• NALBI Inc.  
• Pilot AI  
• Reality AI  
• Sensory  
• SILVIA |
| **Middleware Software and Frameworks** | • CoreAVI  
• Harman/Redbend  
• Paragon Software  
• Recon Technologies (Voice, Audio)  
• Tuxera |
| **Security & Safety Frameworks** | • Arm STLs  
• Argus  
• Escrypt  
• Irdeto  
• Karamba |
| **Multi-Operating System & Safety Separation Solutions** | • Auto Grade Linux  
• AUTOSAR Classic & Adaptive  
• Elektrobit  
• ESOL  
• ETAS  
• Elektrobit  
• SYSGO  
• QNX  
• Vector  
• Virtual Open Systems  
• Elektrobit |
| **Platform Firmware** (e.g., Secure Boot, Secure Storage) | • Arm Trusted Firmware  
• SIP provided  
• Qualcomm  
• Renesas  
• Samsung  
• Silicon-Mobility  
• ST Micro  
• Telechips  
• TI  
• Toshiba  
• Xilinx  
• Elektrobit |
| **Silicon Devices & Board Products** | • NXP  
• Cypress  
• MediaTek  
• NVIDIA  
• Panasonic  
• Telechips  
• TI  
• Toshiba  
• Xilinx |

Solutions list is not exhaustive.
Thank You!